[JOURNAL OF GAS LIGHTING.]

PIPES FOR GAS AND OTHER PURPOSES.

(Continued from SUPPLEMENT No. 66).

AT the close of our last, we referred to the method of jointing with Russian tallow. The metal of the socket in this case need not be stronger than that in the body of the pipe. Several coils of spun-yarn, covered with putty or very thick paint, are first driven into the bottom of the socket. Tarred gasket, made of such a thickness as to fit tightly into the annular space between the spigot and the socket, is then calked round the lip of the latter in such a manner as to leave about 1½ inches of space between the yarns. On the upper side of the pipe the ends of the gasket are drawn out to form a mouth, and a mixture of two parts of melted Russian tallow and one part of common vegetable oil being poured, while warm, through the mouth, runs into and fills up the space all round. Fig. 19 shows the complete joint; the light portions of the plugging being the yarns, and the dark portion between them the tallow.

In the earlier days of gas lighting, after the objections to the use of the rigid flange joint had become apparent, the lead joint, as described in our last week's article, was invariably employed in the laying of mains. Even at the present day, some managers prefer this before any other. Whilst admitting, and that not unreservedly, its excellence when carefully made, and its value and utility under certain extreme conditions, such as the subsidence of the ground in which the mains are laid, we believe that, in a general way, it cannot be compared with the bored and turned joint, either on the score of cheapness, tightness, or durability. It is much to the credit of the late Mr. Alfred King, the able engineer of the Liverpool Gas Works, that he was first to apply this latter description of joint, having adopted it as far back as the year 1826. These are universally in use in the streets of Liverpool and Manchester, where the traffic is enormous, and where defective and insufficient joints would be particularly objectionable.

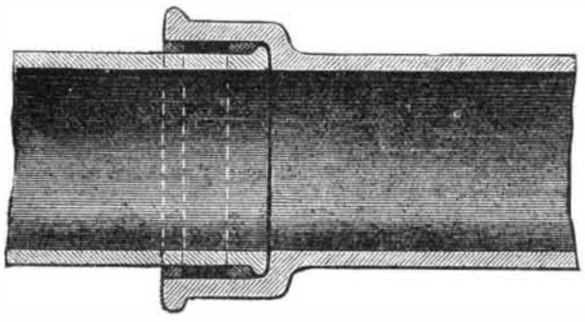


FIG. 19.

It is sometimes urged, in opposition to the turned and bored joints, probably by those who have had least experience in their use, that, owing to the contraction of the metal in winter, the pipes are drawn, and that heavy leakage is the consequence. If there is any foundation of truth in this allegation, it arises from defects that need not necessarily present themselves.

The failure of some of these, in places where they were adopted for the first time, was due to the circumstance of the surfaces having been made too tapering in form. It is well known that the more conical a plug is made the easier it is of displacement from its seat, and the wider the interval between its surface and that of its seating produced by an equal extent of withdrawal. So in the matter of which we are treating, the nearer the two surfaces can be kept to the true cylindrical shape the better, not only for ease in connecting, but in permanent efficiency and tightness. We know, as a matter of fact, that leakage rarely occurs with properly constructed—that is, all but cylindrical—joints, such as we have described.

It must be remembered that there is a lateral as well as a longitudinal contraction of the metal; and as the socket of the pipe has a greater bulk of metal than the spigot, it follows, as a natural consequence, that it contracts to a greater extent than the other, so retaining soundness of the joint notwithstanding the drawing of the pipe end from its original seat.

As a general rule, then, it may be asserted that pipes with bored and turned socket and spigot joints are superior to all others for gas mains. Their first cost is not more, or but a trifle more, than open joints. The speed, certainty, and cheapness with which they can be made far exceed most others in these respects. The soundness and durability of the joint is undoubted, and the ease with which it can be taken asunder, without damaging the pipes, in cases of renewal and enlargement of mains, is not its least recommendation. The bored and turned joint is easily manipulated so as readily to follow any ordinary curves, but when these are sharp and angular an occasional lead or iron cement joint has to be employed.

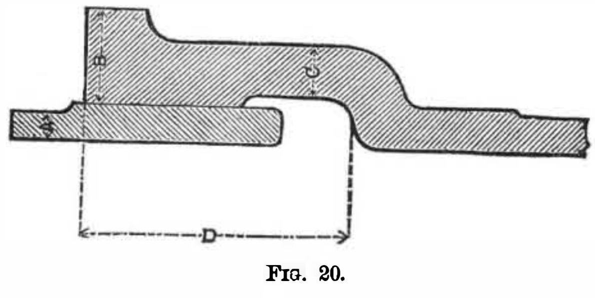


FIG. 20.

The application of the turned and bored principle to the joints of the various branches and bends required in main laying is more difficult, and consequently not so common as with the straight lengths, although it has been attempted in several instances with success.

In laying turned and bored pipes, the spigot and socket ends are carefully cleaned with cotton waste; and, if rusty in any degree, by a piece of wire card. It is scarcely needful to say that the use of a file for that purpose is altogether inadmissible. The clean surfaces are then covered, by means of a brush, with a coating of thick paint, composed of one part of white and one part of red lead, mixed with boiled linseed oil. The pipe is then lowered into the trench, the end inserted and driven home with a mallet if the pipes are of small diameter, or with a swing tupping-block if large.

In driving the pipes, they will sometimes be found to spring back at every stroke. This may be due to one of two causes either the joint is too conical in form, as previously mentioned, or there is a slight ridge or roughness left on the inside edge of the bored part of the socket or turned portion of the spigot. This latter can easily be removed with a chisel; but the former is a radical defect that is incurable—a permanently close and durable joint under the circumstances being impossible.

One great merit of the turned and bored joint is the ease and facility, and the consequent saving in cost, with which pipes can be joined by its aid. This economy would, of course, go for nothing if the after results of the system were unsatisfactory; but when it is found that the economy is supplemented by efficiency, then we realize the full value of the work.

We have no hesitation in speaking strongly on this point, having had a long and varied experience with the different joints, under the most opposite conditions of soil, situation, and temperature, in recommending the general adoption by managers and engineers of the bored and turned joint in the laying of ordinary gas-mains, resorting to the use of lead, or of iron cement, in the jointings of the various branch-pipes and bends.

In a paper read before the British Association of Gas Managers in 1868, by the late Mr. Rafferty, of Manchester, whose experience on all matters connected with main and service laying was very great, the following estimate of the saving effected per joint, in laying a 30 inch diameter turned and bored, as compared with a lead-jointed main, is given. The particulars of the items dispensed with, and which are required in making a lead joint of the size named, are as follows:

	£	s.	d.
54 lbs. of lead at 2·4d.	0	10	9½
White yarn, 4½ lbs., at 8d.	0	3	0
Making calking chamber	0	1	9
Melting lead and making joint	0	0	10
Quarter cwt. of coal	0	0	2
Extra soil to be carted away	0	1	1½
Flagging or pavement taken up and re-laid, 3 yards, at 1s. per yard	0	3	0
	1	0	8

Since the year mentioned, the cost of both labor and material has increased, consequently the gross saving of the turned and bored over the lead jointing will be greater at the present time than is represented by the above sum. An allowance ought to be made in the calculation for the cost of the red and white lead paint used for coating the turned and bored joint of the size given. A sum of 4d. will be ample for this purpose.

FIG. 21.

We append the usual table giving the approved thickness of metal in the sockets, and also in the body, of turned and bored pipes of the different sizes, from 2 inches up to 20 inches, the accompanying engraving (Fig. 20), explaining the particular parts to which reference is made. The depth of the socket is also stated in each instance.

Table of the Thickness of the Metal and the Depth of the Sockets (inside measure) of Turned and Bored Cast-Iron Gas-Pipes.

Dia. of Pipe.	A	B	C	D	Dia. of Pipe.	A	B	C	D
Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
2	5/16	7/8	1/2	3	10	5/16 full	1¾	7/8	4½
2½	3/8 bare	15/16	9/16	3¼	11	9/16	1 13/16	15/16	4½
3	3/8	1	5/8	3¾	12	9/16	1 13/16	15/16	4½
3½	3/8	1⅛	5/8	3¾	13	9/16 full	1⅞	15/16	4½
4	3/8 full	1¼	11/16	4	14	9/16 full	1⅞	15/16	4½
5	3/8 full	1⅜	11/16	4	15	9/16 full	2	1	5
6	5/16	1½	3/4	4½	16	5/8	2	1	5
7	5/16	1 9/16	3/4	4½	17	5/8	2⅛	1 1/16	5¼
8	5/16	1⅝	13/16	4½	18	11/16	2⅛	1 1/16	5¼
9	5/16	1 11/16	7/8	4½	20	11/16	2¼	1⅛	5¼

It is sometimes preferred by engineers to combine the turned and bored with the lead or cement joint, by having the socket of the pipe cast with a recess in front of the bored part of about 1½ or 2 inches in depth (Fig. 21), so that in the event of leakage from the turned and bored portion of the joint, it may be supplemented by a plugging of other materials—either lead, iron, cement, or Portland cement. If the pipes are of good quality, being obtained from a manufacturer of repute, and proper care bestowed upon the boring and turning, there is no necessity for this; though it must be admitted that, in many instances, these indispensable conditions as to quality are not observed.

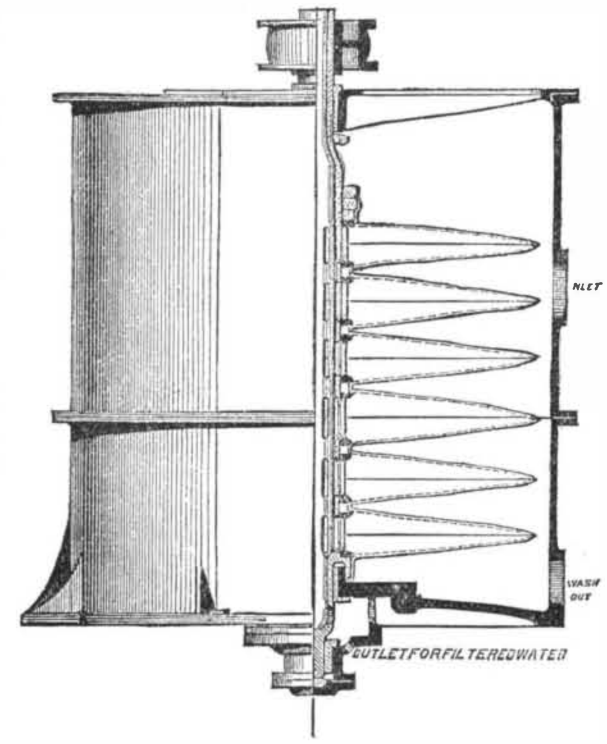
NEW ROTARY FILTER.

FOR filtering the grosser suspended impurities from water in large quantities, nothing has been found more effectual than bagging or cloth of a strong but not very close texture. For waterworks, settling tanks, or reservoirs, it has been hitherto employed, but the objection to this form of preliminary filter is the space and time occupied. Various expedients have been resorted to for filtering large quantities of water for baths, etc., and the difficulties attending the cleaning, bagging, or other filtering medium, when it has become clogged after a few minutes or hours of work, according to the quantity of matter in suspension, have not been effectually overcome. The filter we illustrate has been designed by E. Perret, of Abingdon street, Westminster, London, to overcome these difficulties, and one has now been in successful operation about six months at the Swimming Baths, King's Road, Chelsea.

The machine consists, as will be seen by our engraving, of a series of pairs of perforated copper disks, strung on a central hollow spindle provided with a pulley, and capable of rotation, the whole being contained in a circular tank. Over the disks is stretched the filtering material, which in this particular machine is filter cloth, and which is tied in between the disks, thus following their shape.

The liquid to be filtered is let into the spaces outside the disks, and passes through the cloth into the hollow spindle and hence into a tank below, leaving its impurities on the outside of the cloth. When the cloth is choked—the time in which this is effected, of course, varying with the quantity of impurities in the water—the external water is run off, and the spindle rapidly rotated; the dirt, by this means, is thrown off, and a little water being applied, either internally through a central sparge pipe or from an external pipe, the cloth is perfectly cleansed, and the mud washed away.

During a recent experiment, a large quantity of Thames mud was mixed with the water in the filter tank, the water running from the filter nearly equal to that taken from the street main. By passing the water through a bed of charcoal, which, it seems, remains effective for practically an unlimited time, the water is rendered quite limpid. In about 40 minutes about 2,000 gallons of water charged with 25 grains of matter in suspension to the gallon passed through the filter, which has 200 ft. of surface, and the filter was cleaned ready to recommence filtering in about two minutes.



NEW ROTARY FILTER.

It is not, of course, pretended that this arrangement of cloth filter will do more as regards purification than has already been done by similar filtration; but the great disadvantage attending the use of filters for such very impure or turbid water has been overcome by supplying a means whereby the filter cloth may from a clogged state be cleansed and made ready for recommencing its work in an exceedingly short space of time. Thus, in fact, making it possible to deal with large quantities of water in a small space.

At the Chelsea Baths the filtering of the warmed water from the swimming baths is a matter to the proprietors of great importance, as, without some efficient filter, the water once used must be allowed to go into the sewers, carrying with it all the heat imparted to it, and which at considerable expense must be given to a continually renewed quantity of cold water. Of course new water is continually being added to that filtered, but, as above stated, the preliminary work of the machine illustrated, which reduces the impurities to from 2½ to about 4 grains per gallon, is supplemented by a charcoal filter. In the hands of large consumers of water the machine promises to become an important one, as it is of great assistance by giving them a ready means of dealing with their supplies, and more especially when they become, owing to floods, etc., seriously impregnated with matter in suspension, which would choke and render useless an ordinary filter in a few minutes or hours at the longest. In cases where it is advantageous to use the Clark process for softening water, the lime may, according to the inventor, be mixed with the dirty water, and the carbonate removed with the mud filtered out.

We understand these machines can be made continuous in their action if required, special arrangements being made for dealing with sugar, sewerage, etc., where it is desired to utilize the matter filtered out. The total cost of filtering by this machine is estimated at 1d. per 1,000 gallons, including the cost of pumping the water into the filter, and the cost of renewals, depreciation, etc.—*Engineer.*

THEORY OF THE BUNSEN LAMP.

AT a recent meeting of the Chemical Society, London, Professor Abel, F.R.S., President, in the chair, Prof. Thorpe gave his lecture "On the Theory of the Bunsen Lamp." The speaker, after some preliminary remarks as to the great value of this lamp, both to the scientific chemist and in the arts, pointed out the origin of it at the time when Bunsen introduced coal-gas into his laboratory: he considered the contrivances which had been used in this country as unworthy of the fuel they had to burn, and, bringing his own inventive powers to bear on the subject, the Bunsen lamp was the result; the original apparatus differing but little from that now generally in use. After a short description of the lamp, the mode by which the air is drawn in at the holes at the bottom, and caused to mix with the gas, was considered. This is due to the well-known fact that when a gas issues from an orifice under pressure it carries with it more or less of the circumjacent air, partly as the result of the expansion, and partly as the result of its viscosity. This was experimentally illustrated by an ingenious adaptation of List's multiplying manometer, which, when connected with one of the holes at the base of a Bunsen lamp, distinctly showed the rarefaction produced by the gas as it issued from the jet, despite its low pressure. The intermixture of the gas and